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## The Personal Security of Inhabitants of Selected Countries in the Light of Research on the Perceiving of Threats Caused by the COVID-19 Virus

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**Abstract:**

**Purpose:** The objective of this article is to identify and recognise the level and scope of disruptions caused to personal security by the COVID-19 virus, and assess the differences in the perceiving of personal security by inhabitants of three selected countries.

**Design/Methodology/Approach:** A systematic review of international publications on the theory of threat and signal perceiving and a diagnostic survey carried out using the CAWI (Computer-Assisted Web Interview) methods were used. Statistical methods involving a proportion difference test between two populations were used to assess the significant differences in the perceiving of personal security by inhabitants of the selected countries in each of the examined dimensions. Three populations were considered - Polish, Ukrainian and Bulgarian citizens.

**Findings:** The results show that no significant differences were observed in the perceiving of personal security among the inhabitants of the analysed countries. Also, threats assessment depends on individual cognitive processes, including an individual interpretation of threats, and differences exist between assessments and opinions regarding threats and security from the period of May to June, 2020, and those made at the beginning of the pandemic.

**Practical Implications:** Quite large groups of people in each examined country felt their personal security was partially, or to a small extent, compromised due to COVID-19. This is illustrated in the models presented in the paper, where the sense of personal security stems from the individual perceiving of threats.

**Originality/Value:** This article is a compilation of the results of years of research related to the effectiveness of the perceiving of threat signals in the following areas: economy, medical rescue, police, fire department and army operations. The results of empirical research on the perceiving of personal security in the face of the COVID-19 pandemic, are essential addition of this topic.

**Keywords:** Threat perceiving, human security, personal security, situational awareness.

**JEL classification:** F52, H55, Z19

**Paper Type:** Research study.

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## **1. Introduction and Background**

The instinct to seek security dates back to the beginning of the world of living things, and is an essential link in preserving the continuity of its evolution. This applies to both individuals and groups - from herds of animals or colonies of social insects to nations and states made up of human beings. Mankind has known the concept of “security” for a very long time and it has been one of the main anthropocentric categories. Security is, on the one hand, a primitive and existential value and a basic necessity of every human being, which ensures the survival and development of individuals and social groups. On the other hand, however, it can be regarded as a “state of mind” defined by the level of certainty and peace of mind arising from a low level of perceived threats, optimistic prospects of development and effective measures protecting against negative phenomena and processes.

In 1994, the United Nations declared “human security” as the main objective of development for “human-centred” societies in the 21st century. The concept of “human security” and its accompanying agenda were included in the UN Human Development Report in 1994 (UNDP, 1994), presenting an approach to national and international security which gives priority to human beings and their complex social and economic interactions. The report introduced a new definition of human security that is related to people and development, not to territories and weapons. It identified human security challenges at both the domestic and global levels (Breslin and Christou, 2015; Caballero-Anthony, 2015; McDonald, 2002; Gasper, 2005).

The concept of human security encompasses numerous dimensions (McDonald, 2002) and continues to evolve. One of these dimensions is health security (Fukuda-Parr, 2003), with particular emphasis on the impact of mass and easily transmitted infections on human security (Heymann 2003; Peterson 2002; Knutson 1954). In the history of civilisation, pandemics were that major threats to the national security of many states. A systematic review of publications on the impact of pandemics on national security was presented by Kamradt-Scott and McInnes (2012).

The COVID-19 pandemic, which broke out at the beginning of 2020, has become a global problem, spreading into the farthest corners of the world. Due to its unprecedented scale and infectiousness, it has had an impact on the existence of humans, as well as on whole societies, which have been subjected to various

restrictions (Grima *et al.*, 2020; Khan *et al.*, 2020). The pandemic has forced billions of people to change their way of life, and has violated all aspects of human security, including personal security. However, the category of personal security, often linked to crime, violence or personal data security (Gasper and Gómez, 2015), should be extended to the security of an individual in the following seven dimensions: economic, food, health, natural environment, personal, social and political (UNDP, 1994; Forbes-Mewett, 2018).

The outbreak of the COVID-19 pandemic has shaken various facets of human life, including the personal security of a significant part of the global population (Mishra *et al.*, 2020; Shiina *et al.*, 2020; Rachman, 2012; Cao *et al.*, 2020; Kaparounaki *et al.*, 2020; Islam *et al.*, 2020). The main research problem of this paper is the assessment of the extent to which the situation related to the coronavirus pandemic has compromised the personal security of people in Poland, Bulgaria and Ukraine, including a preliminary assessment of the dimensions where personal security has been most affected.

## 2. Threat Perceiving – Theoretical Aspects

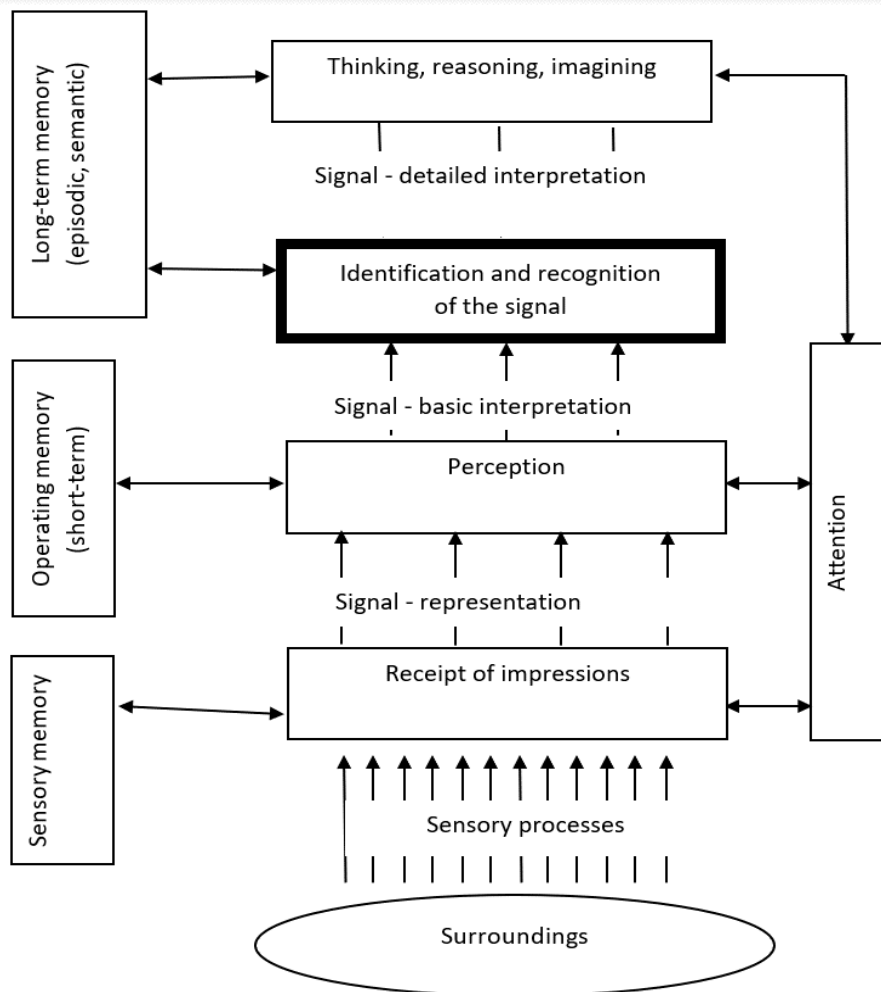
A given sense of security is generated as a result of reading signals that carry information about possible threats. The process of reading signals takes place in the mind and nervous system of the observer, and consists in the registration and recognition of individual or combined graphic symbols, electric, light, magnetic, acoustic or other impulses, and their subsequent interpretation. As a result of the above-mentioned experience, an internal decision-making process is initiated in the mind of the observer, which generates and is introduced into the consciousness specific content that is the product of detailed processes of signal recognition and identification. The final identification and recognition of a signal under given circumstances (temporal and spatial) is the outcome of sensory, mental and cognitive processes. The result of the processes is a sense of security felt by the observer and the associated level of neurophysiological processes (Ramsey *et al.*, 2004).

### 2.1 Integrated Warning Signal Perceiving Model

Figure 1 shows the warning signal perceiving model (Ćwik and Świerszcz, 2018). It presents the integrated components of the perceiving process of a signal or a combination of signals. The model comprises all components of sensory processes, basic mental processes and components of higher mental processes (thinking, reasoning, imagining). As a result, the final identification and recognition of the signal is a superposition of the bottom-up processes (generated by the senses) and top-down processes (generated by the mind) (Figure 1).

The relatively low complexity and low energy input needed for their implementation are a characteristic feature of the bottom-up processes. These processes primarily make use of sensory and working memory. They are repeatable and are read in the same way by individual observers. In turn, higher mental processes, mainly involving cognition, take place in more advanced areas of the nervous system. In the model presented in Figure 1, they are referred to as “top-down processes”. Unlike “bottom-up processes”, these are unique for each observer and largely depend on individual experiences, cognitive resources and the current psychophysical state of the observer. They require much more energy and effort. The process of warning signal perceiving is the outcome of the superposition of bottom-up and top-down processes.

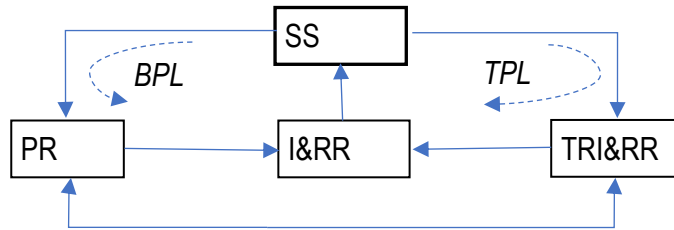
**Figure 1.** *Model of an integrated signal perceiving process*



**Source:** Own study: (Ćwik and Świerszcz 2018).

The implementation of the above mentioned processes requires a certain energy input, and its amount is determined by the natural balance, resulting from the 3rd law of thermodynamics (Bilal Canturk *et al.*, 2017; Ćwik, 2019). These processes take place in stages in two loops - the bottom-up processes loop and the top-down processes loop (Figure 2).

**Figure 2.** *Loops of identification and recognition of the observer's state of security*



**Note:** I&R = identification and recognition; PR = perceiving; TRI = thinking, reasoning, imagining; SS = security state; BPL = bottom-up processes loop; TPL = top-down processes loop.

**Source:** Own study

The number of stages in the two loops depend on several factors (e.g. scope of threat, proximity in time and space, emotional arousal, temperament, mood, current psychophysical state, motivation etc.). These factors determine the amount of energy input that the observer's body is ready to provide at a given moment in order to identify and recognize the current state of security. The sense of security also involves the activation and presence of given neurophysiological processes in the observer's body. As research indicates (Ćwik, 2019), the amount of energy input is subject to the so-called “universal optimization logic”, which is a property of systems of nature. According to the logic, each action follows the third law of thermodynamics, according to which systems perform their tasks with the lowest possible energy input.

The model identifies the basic subsystems that have an impact on the effectiveness of the identification and recognition of warning signals. One of them is the attention system (Figure 1). Attention allows only part of the stimulus that enters the senses of signal monitoring to be perceived (Deng and Sloutsky, 2016; Posner and Petersen, 1990; Treisman, 1982). This perceiving subsystem was developed in the course of the evolution process in order to save the energy expenditure of the observer and reduce the surplus of information (Aly and Turk-Browne, 2016; Schupp *et al.*, 2007).

Another component of the threat perceiving system is the memory subsystem (Figure 1). Memory can be understood as the ability to record, code, store and recollect data in the form of sensory impressions, associations or information, where:

- recording involves the process of acquisition of incoming data;
- coding involves organisation and transformation of incoming data so that it can be stored in memory and converted into signs;
- storage means retaining encoded data in memory;
- recollection involves accessing data stored in memory.

These are called engrams, i.e. fixed memory traces of neurochemical signal transmission (Takamiya *et al.*, 2020; Langille and Gallistel, 2020; Goode *et al.*, 2020; Tonegawa *et al.*, 2015).

In the model presented in Figure 1, the recorded signals are first transformed into stimuli and then into observations (Zimbardo and Gerrig, 2014). They are subsequently passed on as part of the bottom-up processes, where they meet the parallel processes of selection and categorization, carried out with the participation of memory and thinking as part of the top-down processes. As a result, the content of the signal is recognised and identified. Such processes of perceiving involve active reception, analysis and interpretation of sensory impressions.

In the process of perceiving, the components of mental processes are integrated, as a result of which an individual is able to reflect (create cognitive representations) elements of reality currently acting on his or her receptors and recognize the meaning of these objects, decoding the incoming data with representations stored in the brain. Such processes of perceiving are supported by the processes of attention, memory and thinking.

The processes of cognitive activity referred to above are of an active nature, result in the acquiring of information about the environment, processing this information, integrating the data collected and incorporating it into knowledge systems, subsequently using it in decision-making processes and formulating assessments or decisions, including an assessment of the current state of security of the person. This is one of the key assessments carried out on an ongoing basis, which is linked with the evolutionary mechanism to ensure the survival of the individual. This assessment may be carried out consciously or unconsciously, and in some cases, it may be disturbed or distorted by various factors (Tversky and Kahneman, 1981; Ćwik, 2017).

While examining the problem of the identification and recognition of warning signals, it can be noted that the terms “perception” (Sussman *et al.*, 2016) and “perceiving” are used interchangeably in the available literature. However, it seems that the term “perceiving” would be more appropriate here. Perception can be interpreted as the result of an objective, repeatable process of perceiving, implemented mainly in the loop of bottom-up processes, while perceiving is subjective in nature and is the result of superposition of multi-stage processes in both the bottom-up and top-down processes loop.

## 2.2 Warning Signal Visibility Model

The warning signal visibility model can prove helpful in enhancing the effectiveness of reading warning signals. The model is based on the concept of signs put forward by Carl S. Peirce (Anderson and Hausman, 2012; Hausman, 1993; Hiltunen, 2008). It assumes that warning signals have the structure of a triad, consisting of three components: interpretation, representation and impact, where impact is the agent that causes the threat (e.g. physical, chemical, social, mental or other forces with potentially negative effects). The observer, or the risk analyst, does not read the scale of a given impact directly, but reads and records its representation. For example, the measurement of a thermometer read directly by an observer is a representation, and the impact correlated with this representation is temperature. This, however, requires further interpretation, since, for example, a measurement showing 40°C may signify a danger to the human body or the ambient temperature, but for a combustion engine cooling system or a domestic heating system, it may be a sign of its proper functioning. A similar observation can be made for other representations, such as pressure, frequency, voltage or electric current, etc.

As a result, the warning signal model can be represented as a vector  $S$  with three components:

$$S = \langle I, R, O \rangle$$

where  $I$  = interpretation,  $R$  = representation and  $O$  = impact.

Each of the above-mentioned components is characterised by a specific level of visibility (recognition level), as specified below:

1. insignificant;
2. partially (moderately) significant;
3. highly significant.

For the “interpretation” component, these are the levels of cognitive resources associated with a given impact, allowing for the interpretation of recorded and read quantities and their values

$$I \langle i_1, i_2, i_3 \rangle$$

- $i_1$  - insignificant level of cognitive resources - in general, it indicates a lack of knowledge and experience in terms of a given impact, most often it is type II uncertainty (Ćwik and Świerszcz, 2018);
- $i_2$  - moderately significant level of cognitive resources related to a given impact, often it is either incomplete knowledge or type I uncertainty;

- $i_3$  - highly significant level of cognitive resources - the level of knowledge in terms of a given impact is sufficient.

For the “representation” component, these are the levels of visibility of the quantities related to a given impact.

$$\mathbf{R} < r_1, r_2, r_3 >$$

- $r_1$  - insignificant level of the “representation” visibility – it is not possible to read the values related to a given impact either due to impaired or inaccurate reading;
- $r_2$  – moderately significant level of the “representation” visibility - it is possible to partially read the values related to a given impact, but the reading is incomplete due to technological or organisational reasons;
- $r_3$  - highly significant level of the “representation” visibility - it is possible to read the values associated with a given impact to a full or satisfactory extent.

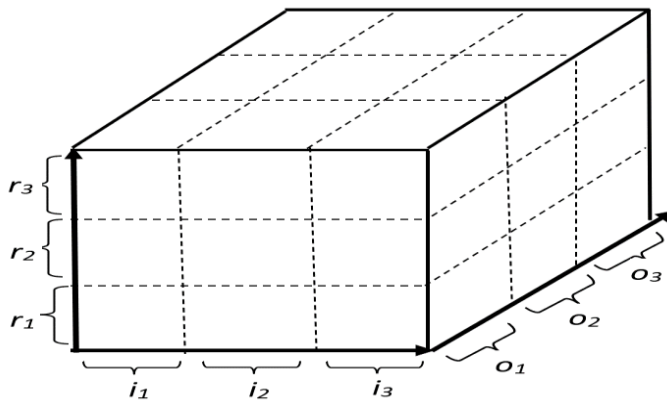
For the “impact” component, these are impact intensity levels

$$\mathbf{O} < o_1, o_2, o_3 >$$

- $o_1$  - no or insignificant level of impact, which does not pose a threat to its object,
- $o_2$  - moderately significant level of impact, which, to some extent, poses a threat to its object; in this case it can be assumed that the object is in a state of threat (e.g. in a critical situation or an emergency),
- $o_3$  - highly significant level of impact - this level has a limit value, which, when exceeded, will result in permanent qualitative changes.

Consequently, a sign  $\mathbf{S} = < \mathbf{I}, \mathbf{R}, \mathbf{O} >$ , which is a warning signal about a threat, may have 27 different levels of its visibility (recognisability) (Figure 3).



**Figure 3.** Model of visibility warning signal components

**Source:** Own study.

It should be noted that most analyses fail to take into account the different levels of visibility of individual components of a sign, but rather focus on identifying a highly significant area of impact and “representation”, as well as a sufficient level of cognitive resources, or in other words, they assume the full level of warning signal visibility:

$$\mathbf{Z} (3,3,3) = \langle i_3, r_3, o_3 \rangle$$

The model presented here indicates that the process of reading a warning signal, including the identification and recognition of the security level, may be significantly disturbed or distorted due to the incomplete visibility of its individual components. This can contribute to errors and inefficiency in reading warning signals, issuing warnings in a timely manner, or taking preventive measures.

In practice, when the value of the impact threatens the state of security (i.e. when the **O** component is level 3), the other components may have lower levels:

- $\mathbf{Z} (1,1,3)$  – lack of cognitive resources and invisibility of representation;
- $\mathbf{Z} (1,2,3)$  – lack of cognitive resources and partial visibility of representation;
- $\mathbf{Z} (2,1,3)$  – incomplete (partial) cognitive resources and invisibility of representation;
- $\mathbf{Z} (2,2,3)$  – incomplete (partial) cognitive resources and partial visibility of representation;

- Z (3,1,3) – sufficient cognitive resources but invisibility of representation;
- Z (1,3,3) – complete visibility of representation but lack of cognitive resources;
- Z (3,2,3) - sufficient cognitive resources and partial visibility of representation;
- Z (2,3,3) – incomplete (partial) cognitive resources and complete visibility of representation.

It should also be noted that the **R** component is recorded and read mainly within the bottom-up processes loop, while the **I** component is read mainly within the top-down processes loop.

The analysis of the issue of the spread of COVID-19 virus (WHO, 2020; Mishra *et al.*, 2020; Shiina *et al.*, 2020; Islam *et al.*, 2020), indicates that many countries were quite late in introducing measures in order to curb the pandemic, which was mainly due to incomplete visibility (components R and I) of the warning signals among decision-makers, as well as among citizens.

### **3. The Perceiving of Personal Security Among Inhabitants of Selected Countries during the COVID-19 Pandemic**

The state of security of an individual results from the perceiving of recorded signals about possible threats, contained in information registered by the senses. Perceiving is a multi-stage process which involves the entire cognitive system of the observer, with neurobiological and physiological processes occurring in parallel.

The objective of the research was to assess the degree of the loss of the sense of security felt by inhabitants of selected countries as a result of the COVID-19 pandemic, as well as to verify whether there were differences between the examined countries in this regard.

#### **3.1 Research Method**

The research was carried out with the use of the diagnostic survey method CAWI (Computer-Assisted Web Interview). The statistical methods used involved a proportion difference test between two populations. The statistical significance differences in the perceiving of personal security by inhabitants of the selected countries in each of the examined dimensions were assessed. Three populations were taken into consideration - Polish, Ukrainian and Bulgarian citizens. Since the samples from each country were sufficient ( $n > 100$ ), and the samples were taken independently, it was assumed that the distribution of proportions from the samples  $\hat{p}_1$   $\hat{p}_2$   $\hat{p}_3$ , can be approximated by a normal distribution, and the difference in proportions of the samples will likewise be normally distributed.

This made it possible to base the proportion difference test on a standardized normal distribution. The null hypothesis  $H_0$  assumed no differences between the examined proportions, while the alternative hypothesis  $H_1$  predicted that the differences between these proportions would be statistically significant. Individual tests were carried out at the significance level  $\alpha = 0,05$ , for which the value of the statistics equals  $z = 1.96$ . The statistics for the differences between the proportions were determined from the following correlation:

$$z = \frac{\hat{p}_1 - \hat{p}_2}{\sqrt{\hat{p}_0 (1 - \hat{p}_0) \left( \frac{1}{n_1} + \frac{1}{n_2} \right)}}$$

where:  $\hat{p}_1 = \frac{x_1}{n_1}$ , proportion from the sample taken from population 1

$\hat{p}_2 = \frac{x_2}{n_2}$ , proportion from the sample taken from population 2

$\hat{p}_0 = \frac{x_1 + x_2}{n_1 + n_2}$ , total proportion in the combined samples.

### 3.2 Research Implementation

The research was conducted in several countries, mainly Poland, Bulgaria and Ukraine, and involved a total of 672 respondents: 403 people (60%) from Poland, 155 people (23%) from Ukraine, and 114 people (15%) from Bulgaria.

The respondents were mainly selected using social media platforms. This often involved reaching out to strangers or making use of the researcher's academic contacts. The questionnaire was prepared in an electronic form and sent directly via the Internet. The research is still in progress, and this paper presents only the results from the period April-June, 2020.

The demographic structure of the research sample was as follows:

1. 42% of the respondents were women and 58% were men.
2. Education of the respondents:
  - secondary education or lower - 57%;
  - undergraduate degree (BA, Eng.) - 22%;
  - graduate or post-graduate degree (master, doctorate and higher) - 20%.
3. Place of residence of the respondents:
  - City with more than 100,000 inhabitants – 43%
  - City with less than 100,000 inhabitants – 25%
  - Village - 22%
4. Occupational status of the respondents:
  - employed – 39%

- student – 56%
  - unemployed or pensioner – 5%
5. Age group of the respondents
- Younger than 34 years old - 78%
  - Between 35 – 54 years old – 16%
  - over 55 years old – 6%

### 3.3 Research Results

Tables 1 and 2 presents the research results. In order to examine the sense of personal security in Poland, Ukraine and Bulgaria, proportion difference tests were carried out on an ongoing basis, the aim of which was to assess whether the inhabitants of these countries differently perceived the threats related to the COVID-19 pandemic. Such tests were carried out for specific questions, as well as specific anxieties.

**Table 1.** *Opinions regarding the sense of personal security in Poland, Ukraine and Bulgaria*

No.	Question	Poland PL			Ukraine UA			Bulgaria BG			Mean z value Z <sub>av</sub>		
1.	Do you agree with the opinion that “COVID-19 is not real”?	Y	N	O	Y	N	O	Y	N	O	Y	N	O
		31 %	59 %	10 %	35 %	57 %	8 %	27 %	64 %	9 %	1,04	0,84	0,44
2.	When a state of pandemic was declared in March and restrictions imposed, were you worried about contracting COVID-19?	Y	N	O	Y	N	O	Y	N	O	Y	N	O
		86 %	12 %	2 %	81 %	14 %	5 %	83 %	10 %	7 %	0,90	0,74	1,77
3.	Are you currently afraid of contracting COVID-19?	Y	N	O	Y	N	O	Y	N	O	Y	N	O
		69 %	30 %	1 %	72 %	26 %	2 %	71 %	26 %	3 %	0,43	0,59	1,02
4.	Has the COVID-19 pandemic compromised your sense of security?	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		37 %	33 %	30 %	39 %	36 %	25 %	42 %	24 %	34 %	0,63	1,53	1,20

5	Has the COVID-19 pandemic compromised the sense of security of your family members?	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		53 %	18 %	29 %	49 %	26 %	25 %	56 %	17 %	27 %	1,45	1,34	1,02
6	Has the COVID-19 pandemic compromised the sense of security of your country's inhabitants?	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		66 %	5 %	29 %	65 %	4 %	31 %	61 %	6 %	33 %	0,63	0,56	0,54
7	Has the COVID-19 pandemic compromised the sense of security of people around the world?	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		76 %	3 %	21 %	79 %	4 %	17 %	72 %	3 %	25 %	0,98	0,34	1,19
8.	Is there a threat that your financial income will be reduced due to COVID-19?	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		41 %	37 %	22 %	49 %	26 %	25 %	36 %	45 %	19 %	1,60	2,41	0,87
9.	Is there a threat that the financial income of your family members will be reduced due to COVID-19?	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		49 %	25 %	26 %	52 %	17 %	31 %	48 %	29 %	23 %	0,49	1,74	1,10
10.		Y	N	C	Y	N	C	Y	N	C	Y	N	C

	Is there a threat that the financial income of your country's inhabitants will be reduced due to COVID-19?	75 %	20 %	5 %	72 %	21 %	7 %	69 %	27 %	4 %	0,85	1,00	0,80
11.	Is there a threat that the financial income of people around the world will be reduced due to COVID-19?	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		76 %	21 %	3 %	74 %	25 %	1 %	79 %	16 %	5 %	0,70	1,33	1,47

**Note:** Y – yes (I agree, I strongly agree); N – no (I disagree, strongly disagree); O – neutral answer (it's hard to say, I don't know, I don't have an opinion); C – intermediate result (I partially agree, I'm partially in favour, average threat);  $z_{av}$  – the average value of the statistics from the proportion assessing differences between the analysed populations:  $z_1(PL-UA)$ ,  $z_2(PL-BG)$ ,  $z_3(UA-BG)$ :  $z_{av} = \frac{z_1+z_2+z_3}{3}$

**Source:** Own study.

The state of security is affected by numerous anxieties of an individual, which are the product of top-down processes - thinking, reasoning and imagining. The anxieties expressed by the respondents are presented in Table 2.

**Table 2.** Anxieties related to the sense of personal security in Poland, Ukraine and Bulgaria in connection with the COVID-19 pandemic

No	Type of anxiety	Poland PL			Ukraine UA			Bulgaria BG			Mean Z value $z_{av}$		
		Y	N	C	Y	N	C	Y	N	C	Y	N	C
1.	Contracting COVID-19 in the workplace	30 %	25 %	45 %	26 %	27 %	47 %	31 %	27 %	42 %	0,68	0,34	0,60
		Y	N	C	Y	N	C	Y	N	C	Y	N	C
	Contracting COVID-19 in commercial facilities	34 %	15 %	51 %	38 %	16 %	46 %	51 %	46 %	53 %	1,14	0,55	0,86
		Y	N	C	Y	N	C	Y	N	C	Y	N	C
2.		Y	N	C	Y	N	C	Y	N	C	Y	N	C

	Contracting COVID-19 from a family member	15 %	36%	49%	18%	35%	47%	19%	29%	52%	0,65	0,85	0,60
3.	Contracting COVID-19 in a public place	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		37 %	14%	50%	33%	15%	52%	39%	12%	49%	0,76	0,53	0,37
4.	Contracting COVID-19 while on vacation in one's own country	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		30 %	18%	52%	33%	12%	55%	28%	24%	48%	0,65	1,91	0,84
5.	Contracting COVID-19 while on vacation abroad	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		49 %	15%	37%	52%	13%	35%	46%	22%	32%	0,73	1,44	0,58
6.	Mass outbreak of COVID-19, in March 2020 when the state of pandemic was declared and restrictions imposed	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		62 %	6%	31%	58%	7%	35%	64%	7%	29%	0,75	0,16	0,78
7.	Mass unemployment and panic in financial markets, in March 2020 when the state of pandemic was declared and restrictions imposed	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		64 %	3%	33%	61%	4%	35%	62%	6%	32%	0,43	0,89	0,39

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8.	Mass outbreak of COVID-19, at the moment	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		28 %	15%	57%	32%	8%	60%	33%	13%	54%	0,72	1,28	0,73
9.	Mass unemployment and panic in financial markets, at the moment	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		44 %	5%	51%	47%	6%	47%	48%	6%	46%	0,54	0,28	0,67
10.	Significant changes in one's work	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		36 %	23%	41%	39%	22%	39%	34%	21%	45%	0,63	0,28	0,73
11.	People infected with COVID-19 in one's neighbourhood	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		19 %	33%	48%	25%	30%	45%	26%	23%	51%	1,13	1,30	0,73
12.	Contracting COVID-19	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		19 %	30%	51%	21%	32%	47%	16%	31%	53%	0,77	0,27	0,74
13.	A family member infected COVID-19	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		51 %	13%	36%	46%	14%	40%	48%	20%	32%	0,70	1,24	1,00
14.	Losing one's job due to COVID-19	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		34 %	36%	31%	38%	37%	25%	32%	41%	27%	0,77	0,68	0,84
15.	Losing one's job due to a family member infected COVID-19	Y	N	C	Y	N	C	Y	N	C	Y	N	C
		49 %	14%	37%	47%	13%	40%	52%	13%	35%	0,60	0,25	0,63

**Source:** Own study.



### 3.4 Discussion

The individual perceiving of the situation by the respondents, including the individual interpretation of the signals and information had a significant impact on the opinions and anxieties presented in Table 1 and Table 2.

A number of factors influence the sense of security and, in the case of COVID-19, include, in particular, age and immunity from infection. It should be noted that these are only initial results and that the majority of respondents were people younger than 34 years of age (78%). The obtained results indicate that a large number of respondents were not afraid of contracting the virus, and that the COVID-19 pandemic did not significantly affect their sense of security. More anxieties were observed in terms of the security of the respondents' family members, as well as the security of the country and society as a whole. The respondents seemed to perceive a greater sense of security at home (within one's own country) than abroad. The research also shows that the greatest sense of loss of security in the analysed countries occurred at the beginning of the pandemic, when restrictions were imposed and it later decreased.

No statistically significant differences were observed in the perceiving of threats related to COVID-19 by the inhabitants of the examined countries. The differences are reflected by the statistics  $z_{av}$  of the proportion difference test.

### 4. Conclusion

The assessment of threats depends on an individual and is a result of an individual, integrated process of perceiving signals that carry information about the presence of possible threats. A suggested model for such a process has been presented in Figure 1. Each warning signal is characterised by a specific level of visibility, which affects the quality of threat identification and recognition. The concept of the warning signal visibility model has been presented in Figure 2.

The assessment of personal security, including various anxieties of the respondents indicate that the COVID-19 pandemic has compromised the sense of personal security of a significant group of people. However, it is also evident that for a large group of people, their sense of security was compromised only partially or to a small extent, which may explain the frequent cases of non-compliance with the restrictions by some groups of inhabitants of the analysed countries.

The theoretical framework presented herein, as well as the research results, may prove useful for decision-makers who deal with COVID-19 issues. Moreover, the research results, as well as the developed models, can increase the situational awareness of warning signal observers and risk analysts, making them sensitive to specific areas related to recognising warning signals of threats. This may contribute to the enhanced effectiveness of threat monitoring systems and early warning systems.

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